Dear Faculty, Postdocs, Students, and Friends:

You are cordially invited to attend a seminar presented by

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Title:

"Genome resolved metagenomics reveals role of iron metabolism in regulation of plant microbiome response to drought stress"

DATE: Friday, March 12, 2021
TIME: 12:00 pm PST

ZOOM MEETING ID: 935 2068 0213
PASSCODE: 334093

Host: Julia Bailey-Serres

Abstract: Recent studies have demonstrated that drought leads to dramatic shifts in the partnerships plants have with the microbial world. These changes appear highly conserved across a broad range of hosts and microbial lineages and, at present, the molecular mechanisms underlying these dynamic responses remain largely uncharacterized. Here, we employ genome-resolved metagenomics to recover 55 bacterial genomes from drought-stressed sorghum rhizospheres and use comparative genomics to identify pathways more prevalent within microbial lineages enriched under drought. We identify a group of Actinobacteria with significant enrichment under drought stress in the rhizosphere community and demonstrate that gene copy number of carbohydrate and secondary metabolite transport functionalities are overrepresented within drought-enriched taxa. Furthermore, we reveal that inorganic ion transport and metabolism are strongly associated with drought enrichment, and that within this category, the most abundant COGs are tied to iron metabolism. Using time-series root RNA-Seq data, we demonstrate that

iron homeostasis within the root is impacted by drought stress. Additionally, we show that loss of the maize phytosiderophore iron transporter TOM1/YS3 impacts microbial community composition, leading to significant increases in Actinobacterial abundance. Finally, we show that exogenous application of iron disrupts the drought-induced enrichment of Actinobacteria and their improvement in host phenotype during drought stress. Collectively, our findings implicate iron metabolism in the root microbiome's response to drought and may inform efforts to improve drought tolerance to increase food security.